

CLAIMS:

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1. An apparatus for humidifying a process gas stream, for a fuel cell, the apparatus comprising:

10 a humidification unit having an inlet for the process gas stream, for adding humidity to the process gas stream at a first temperature, to a humidity well in excess of a required humidity level;

15 a first heat exchanger connected to the humidification unit, for cooling the process gas stream to a second, lower temperature, whereby excess moisture in the process gas stream condenses, and for removing the condensed moisture, whereby the process gas stream leaving the heat exchanger has a known temperature and a known humidity level.

20 2. An apparatus as claimed in claim 1, which includes a first heater connected to the first heat exchanger, for heating the process gas stream to a third temperature, greater than the second temperature, whereby the process gas stream has a known absolute humidity level.

25 3. An apparatus as claimed in claim 2, wherein the humidification unit includes a steam injector for injecting steam into the process gas stream.

4. An apparatus as claimed in claim 2, which includes an outlet line connected to the first heater and an elongate heating means provided for the outlet line, for maintaining the outlet line at the third temperature.

30 5. An apparatus as claimed in claim 4, where the elongate heating means comprises elongate electrical heating elements.

6. An apparatus as claimed in claim 2, which includes a separator, for removing the condensed moisture, provided between the first heat exchanger and the first heater.

7. An apparatus as claimed in claim 2, wherein the first heat exchanger includes a first temperature control circuit, for controlling the temperature of the heat exchanger, the first temperature control circuit comprising a conduit for a fluid, a pump for pumping the fluid, and means for cooling the fluid.

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8. An apparatus as claimed in claim 7, wherein the first cooling circuit additionally includes a further heater for heating the fluid.

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9. An apparatus as claimed in claim 2 or 7, wherein the first heater comprises a second heat exchanger, and wherein the second heat exchanger is provided with a second temperature control circuit for controlling the temperature of the second heat exchanger, the second temperature control circuit comprising a conduit for fluid, a pump for circulating the fluid and a third heater for heating the fluid.

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